IN THE CLAIMS

1. (Currently Amended) Method for pre-heating, transforming and melting a metal charge comprising metal scrap, in an electric arc furnace ~~(12)~~ associated with a tunnel ~~(11)~~ that transports, pre- heats and discharges said scrap, the furnace ~~(12)~~ comprising a hearth ~~(13)~~ and a roof ~~(14)~~ through which the electrodes ~~(15)~~ pass, ~~characterized in that it provides~~ comprising the steps of:

- ~~that~~ weighing the furnace ~~(12) is weighed~~ at least periodically ~~in order~~ to detect the quantity of discharged scrap present inside the furnace ~~(12)~~ itself;

- ~~that~~ detecting the temperature of the liquid bath inside the furnace ~~(12) is detected~~ at least periodically, and

- ~~that~~ detecting at least the discharge delivery of the scrap inside the furnace ~~(12) is detected~~ by weighing and ~~is regulated in order~~ regulating at least the discharge delivery of the scrap inside the furnace to maintain said temperature of the liquid bath around a pre-determined value.

2. (Currently Amended) Method as in claim 1, ~~characterized in that the~~ wherein electric power delivered to the furnace ~~(12)~~ is varied continuously from a minimum value in correspondence with ~~the~~ a first unloading step of the scrap to a maximum value in correspondence with ~~the~~ a melting step according to the quantity of scrap present inside the furnace ~~(12)~~ as detected by weighing the furnace ~~(12)~~.

3. (Currently Amended) Method as in claim 1 ~~or 2, characterized in that the~~ , wherein loading of the furnace ~~(12)~~ with the scrap is interrupted before tapping of ~~the~~ liquid

metal from the liquid bath for an interval of between about 8 and 12% of the overall time of the cycle.

4. (Currently Amended) Method as in ~~any claim hereinbefore, characterized in that~~ claim 1, wherein the feed of ~~the~~ electric power to the furnace ~~(12)~~ is interrupted before tapping for a time of up to 5% of the overall time of the cycle.

5. (Currently Amended) Method as in claim 2, ~~characterized in that~~ wherein said minimum value of electric power delivered is made to increase from an initial value of about 40-50% of the working value, to its maximum value.

6. (Currently Amended) Method as in ~~any claim hereinbefore, characterized in that~~ claim 2, wherein a quantity of liquid metal of around 30-40% of the overall capacity is always left in the furnace ~~(12) so as~~ to constitute a liquid reserve for the subsequent cycle.

7. (Currently Amended) Method as in ~~any claim hereinbefore, characterized in that~~ claim 2, wherein in the tapping step the electrodes ~~(15)~~ are at least raised from the liquid bath and ~~the~~ electric feed to them is interrupted.

8. (Currently Amended) Method as in ~~any claim hereinbefore, characterized in that~~ claim 2, wherein between the end of the tapping operation and the start of loading the scrap for the subsequent cycle, ~~the~~ electric feed to the electrodes ~~(15)~~ is interrupted and the following operations are carried out:

a) the furnace ~~(12)~~ is rotated from ~~the~~ a tapping position to ~~the~~ a slagging position ~~in order~~ to interrupt the flow of liquid steel;

b) ~~the~~ cleaning of ~~the~~ a tapping hole is controlled;

c) ~~the~~ a tapping channel is filled with granular material with a high melting point;

d) the furnace is returned to ~~the~~ a horizontal position and abutments are inserted that limit the rotation to ~~the~~ reduced values during normal functioning;

e) the electrodes are enabled to descend and ~~the~~ delivery of electric power is restored.

9. (Currently Amended) Plant for pre-heating, transforming and melting a metal charge consisting of metal scrap, comprising:

a tunnel ~~(11) that transports and pre-heats~~ for transporting and pre-heating the scrap and an electric arc furnace ~~(12)~~,

said electric furnace ~~(12)~~ comprising a hearth ~~(13)~~ to contain the scrap and a covering roof ~~(14)~~ through which electrodes ~~(15)~~ pass, supported and moved by relative arms ~~(16)~~, ~~characterized in that it comprises~~

weighing means ~~(18)~~ to weigh said electric furnace ~~(12)~~,

means to detect the temperature of ~~the~~ a bath of liquid metal inside said furnace ~~(12)~~, and

means able to regulate the speed of unloading the scrap inside said furnace ~~(12)~~ according to ~~the~~ detections made by said weighing means ~~in order~~ to keep the temperature of said bath of liquid metal around a pre-determined value.

10. (Currently Amended) Plant as in claim 9, ~~characterized in that~~ wherein said weighing means comprise load cells ~~(18)~~.

11. (Currently Amended) Plant as in claim 9, ~~characterized in that~~ wherein said hearth ~~(13)~~ is mounted on jacks ~~(17)~~ able to make ~~it~~ the hearth oscillate for a limited angle, comprised between ±4°, during normal functioning, for example during the steps of loading, melting and refining the liquid metal, and for a greater angle, comprised between -15° and +25°, during the steps of discharging the slag and tapping the liquid metal.

12. (Currently Amended) Plant as in claim 9, ~~characterized in that~~ wherein said hearth ~~(13)~~ has a shape, in relation to the inclination that ~~it~~ the hearth assumes in the step of tapping the liquid metal, ~~such as~~ to keep a liquid pool equal to about 30-40% of its capacity.

13. (Currently Amended) Plant as in claim 9, ~~characterized in that~~ wherein said transport and pre-heating tunnel ~~(11)~~ comprises a plurality of injection systems, wherein at least the ~~one~~ injection system nearest the electric furnace ~~(12)~~ has at least a burner ~~(19)~~ and wherein at least in a position adjacent to said burner ~~(19)~~ there is at least an air injector ~~(20)~~.

14. (Currently Amended) Plant as in ~~claims 9 and 13, characterized in that~~ claim 9, wherein in the initial part of said tunnel ~~(11)~~, in a position adjacent to a pre-heated fume-outlet pipe ~~(24)~~, there is a compensation chamber ~~(23)~~ able to function as a sealing system ~~in order~~ to prevent exhaust fumes emerging from the tunnel ~~(11)~~ from leaking into the atmosphere.

15. (Currently Amended) Plant as in ~~any claim from 9 to 14 inclusive, characterized in that~~ claim 9, wherein in cooperation with said transport and pre-heating tunnel ~~(11)~~ there is a sedimentation chamber ~~in order~~ to deposit the particulate, and the sedimentation chamber is associated with ~~which~~ a cooling tower ~~(27) is associated in order~~ to take the temperature of ~~the~~ fumes, entering at about 20 m/s, to about 250°C or less.

16. (New) Plant as in claim 15, wherein the fumes enter into the sedimentation chamber at about 800°C.

17. (New) Plant as in claim 15, wherein the fumes are cooled in the cooling tower at a cooling speed of not less than 250°C/sec.

18. (New) Plant as in claim 15, wherein the fumes are cooled in the cooling tower at a cooling speed of not less than 400°C/sec.